REMARKS

This Application has been carefully reviewed in light of the Office Action mailed February 12, 2003. Claims 1-24 are pending in the Application. In the Office Action, Claims 1-24 were rejected.

Information Disclosure Statements

Applicants submitted an Information Disclosure Statement dated December 20, 1999, citing an article by Miller, et al. entitled "A Comparison of Experimental and Analytical Steady State Intake Port Flow Data Using Digital Physics." The Examiner states that the Miller reference was not included in the submission. Although Applicants have no reason to believe that this reference was not submitted with the December 20, 1999 Information Disclosure Statement, Applicants are submitting a new Information Disclosure Statement, the corresponding PTO form 1449 citing the Miller reference, and the appropriate fee. Applicants respectfully request that the Examiner consider the Miller reference and supply a copy of the PTO Form-1449 for the new Information Disclosure Statement indicating the Examiner's consideration of the reference.

The Examiner also states that a five page Internet printout regarding FLUENT was submitted with, but not listed in, the December 20, 1999 Information Disclosure Statement. Applicants are not familiar with this document and are unaware of how this document found its way into the application paperwork. If the Examiner feels that this reference is pertinent to the present application, Applicants request that the Examiner consider the reference and submit it to the Applicants.

In addition, the Examiner requests that Applicants provide a copy of a paper by Strumolo, et al., entitled "New Directions in Computational Aerodynamics" and other documentation relating to PowerFLOW and FLUENT. Applicants do not have these documents and are unsure why the Examiner believes that the Applicants have these documents.

Claim Interpretation

Applicants agree with the Examiner that the intended use of the claimed invention is not a limitation of the claims of the present application. The Examiner states that the present

application of the claimed system/method as applied to engine/valve design merely refers to intended use. Applicants note that the present claimed system and method may have a variety of uses and that the use of the claimed system and method for engine/valve design is merely one example of an intended use and is not a limitation of the claim scope.

Section 112 Enablement Rejection

The Examiner rejects Claims 1-24 under 35 U.S.C. §112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it most nearly pertains, to make and/or use the invention. Specifically, the Examiner states that undue experimentation would be required to practice the system and method claimed in the present application. Applicants respectfully disagree.

The Examiner states that there is insufficient description of how to use the various modules, such as STL, NASTRAN, ANSYS, and PowerFLOW, with each other. The capabilities and interactions of each of these programs is well known to those skilled in the art. For example, the PowerFLOW documentation cited by the Examiner in the Office Action states: "With PowerFLOW, you can use your own closed geometry in popular formats of STL, ANSYS, MSC/NASTRAN, or MSC/PATRAN exported from your existing MCAD/CAE software." ("Fluid Flow for Competitive Design," pg. 8). Therefore, one skilled in the art would be aware of the details of the individual functions of these program and how they may be used cooperatively.

Furthermore, the Examiner paraphrases various language from the present application that he argues lacks enabling support.

With respect to "*automatically generating meshes*" and "*automatically simulating fluid flow*," the specification states that these functions are performed by the PowerFLOW program and includes details of the methods that PowerFLOW uses to accomplishes these tasks. (Page 6; Lines 32-33 and Page 7; Lines 1-15).

With respect to "*the various recitations pertaining to the engine parts*," the engine components listed in the application, for example, the cylinder head, valves, ports, and intakes, are well known to those skilled in the art.

With respect to "*automatically terminating the simulation when a steady-state condition is reached,*" the steady-state condition is well known to those of skill in the art. In addition, the specification notes that "Steady state may be indicated by one or more simulation measurements such as the measured flow rate changing less than 1% in successive iterations. ... If steady state is reached, then the simulation is terminated." (Page 4; Lines 30-33 and Page 5; Lines 3-4). Furthermore, the Examiner himself has taken Official Notice that terminating the simulation once steady-state conditions have been reached is known to those of skill in the art. (February 12, 2003 Office Action, Page 7, ¶1).

With respect to "*accessing and modifying the template,*" the specification describes in detail the content of the generic template file and how that file is modified:

> "One or more generic template files 18 are modified to incorporate the information provided by user initialization inputs 14 and engineering design files 12. Generic template files 18 define the basic geometry and solid model of the component to be simulated. For example, generic template file 18 may define the various parts of the component to be simulated as a solid, and what the boundary conditions are." (Page 5; Lines 14-21).

> "The user input and the user-specified CAD files are used to modify the basic geometries defined in the generic template files so that the specific part being simulated on has the desired geometries defined in CAD engineering design files 12. For example, CAD engineering design files 12 may describe a solid model of a new port design. The basic geometry of the port in generic template files 18 is then replaced by the geometry defined in engineering design files 12, and the other parts in the cylinder head remain unchanged from what is defined by generic template files 18. (Page 6; Lines 8-18).

Thus, the disclosure enables one of ordinary skill in the art to modify the generic template. In addition, a person of ordinary skill in the art would not need further disclosure than that provided in the specification to be able to access the generic template file so that it could be modified. Accessing computer files is well known in the art.

Therefore, all of the above disclosures are sufficient to enable a person skilled in the art to practice the system and methods claimed in the present application. As such, Applicants believe that Claims 1-24 are in condition for allowance. Favorable action is requested.

Section 103 Rejections

The Examiner rejects Claims 1-24 under 35 U.S.C. 103(a) as being unpatentable over the combination of PowerFLOW News Vol. 4.0 (1998), a PowerFLOW document entitled "Fluid Flow for Competitive Design" (1998), and Applicant's Own Admissions, in view of U.S. Patent No. 5,663,890 issued to Saleh, et al. ("*Saleh*") or the taking of Official Notice. Applicants respectfully disagree.

Independent Claim 1 of the present application recites the following:

> A computerized method of virtual flowbench simulation of fluid flow interaction with an object described in at least one design file, comprising:
> receiving user-defined input via a user interface, the user-defined input including a specification of the at least one design file;
> accessing the at least one design file;
> accessing a generic template describing basic geometries of the object, and modifying the basic geometries of the object with the at least one design file;
> automatically generating surface and volume mesh in the object;
> automatically simulating fluid flow interaction with the object and measuring and storing predetermined data parameters;
> automatically checking the predetermined data parameter measurements to determine whether steady state has been reached and whether a predetermined maximum number of time steps has been reached;
> automatically terminating simulation in response to one of steady state being reached and the predetermined maximum number of time steps being reached; and
> generating an output of predetermined data parameter measurements.

Independent Claims 12 and 23 recite similar, although not identical, limitations.

The Examiner cites "Fluid Flow for Competitive Design" as teaching "import templates." (February 12, 2003 Office Action, Page 6; ¶3). However, this document merely implies that the user can import a template containing closed surface CAD geometry into PowerFLOW. (PowerFLOW – "Fluid Flow for Competitive Design," 1998, Page 7). In contrast, the generic template of the present application contains basic object geometries that may be modified by the user's design file so that the specific part for which the simulation is conducted has the desired geometries defined by the design file. (Specification, Page 6; Lines 8-18). For example, the generic template may contain the basic geometry of an engine

cylinder head, including the basic geometry of a port in that cylinder head. A design file may contain geometry for a new port design. The design file may be used to modify the geometry in the generic template such that only the port geometry is changed while the other components of the cylinder head remain unchanged. (Specification, Page 6; Lines 14-18). Thus, the design file (i.e. the CAD geometry) modifies the geometry already in the generic template before the data in the generic template is used in the simulation. The PowerFLOW reference fails to disclose a generic template, let alone modifying the basic geometries of the generic template with the design file, as recited in independent Claim 1.

In addition, the generic template may also contain simulation parameters, as recited in Claims 11 and 19, provided by the user initialization inputs, such as the maximum number of time steps for the simulation and how often results are recorded. (Specification, Page 5; Lines 15-16 and Page 6; Lines 1-7). The PowerFLOW reference fails to disclose a generic template, let alone a template that may contain information in addition to CAD geometries.

For at least these reasons, Applicants respectfully submit that Independent Claims 1, 12, and 23 are in condition for allowance. In addition, Claims 2-11, 13-22, and 24, which depend from Claims 1, 12, and 23, respectively, are also in condition for allowance. Favorable action is therefore requested.

CONCLUSION

Applicants have made an earnest attempt to place this case in condition for allowance. For the foregoing reasons, and for other reasons clearly apparent, Applicants respectfully request full allowance of all pending claims.

Applicants have submitted a new Information Disclosure Statement, a PTO form 1449, and the appropriate fee with this response. Although Applicants believe that no additional fees are due, the Commissioner is hereby authorized to charge any fees or credit any overpayments to Deposit Account No. 02-0384 of Baker Botts L.L.P.

Respectfully submitted,

BAKER BOTTS L.L.P.
Attorneys for Applicant

Brian W. Oaks
Reg. No. 44,981

Correspondence Address:
2001 Ross Avenue, Suite 600
Dallas, Texas 75201-2980
(214) 953-6986

Date: 5/9/03